



SEQUENCE LISTING

<110> TABOLINA, EKATERINA
RYBAK, KONSTANTIN
KHOURGES, EVGENI
VOROSHILOVA, ELVIRA
GUSYATINER, MIKHAIL

<120> METHOD FOR PRODUCING L-AMINO ACID USING BACTERIA BELONGING TO THE GENUS
ESCHERICHIA

<130> 219594US0

<140> 10/073,293

<141> 2002-02-13

<150> RU 2001103865

<151> 2001-02-13

<150> RU 2001104998

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<150> RU 2001117632

<151> 2001-06-28

<150> RU 2001117633

<151> 2001-06-28

<160> 16

<170> PatentIn version 3.1

<210> 1

<211> 26

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic DNA

<400> 1

ggtctagaca atcgttaagc gtacac

26

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<211> 26

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<213> Artificial Sequence

<220>

<223> Synthetic DNA

<400> 2

ccggatccga tatagtaacg acagtg

26

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 <212> DNA
 <213> Escherichia coli

<220>
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 <222> (1)..(735)
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 Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met
 1 5 10 15
 gaa gga tgc aaa gac agt tta ccg att gtt att agt tat att ccg gtg 96
 Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val
 20 25 30
 gcc ttt gcg ttc ggt ctg aat gcg acc cgt ctg gga ttc tct cct ctc 144
 Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu
 35 40 45
 gaa agc gtt ttt ttc tcc tgc atc att tat gca ggc gcg agc cag ttc 192
 Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe
 50 55 60
 gtc att acc gcg atg ctg gca gcc ggg agt agt ttg tgg att gct gca 240
 Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala
 65 70 75 80
 ctg acc gtc atg gca atg gat gtt cgc cat gtg ttg tat ggc ccg tca 288
 Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser
 85 90 95
 ctg cgt agc cgt att att cag cgt ctg caa aaa tcg aaa acc gcc ctg 336
 Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu
 100 105 110
 tgg gcg ttt ggc ctg acg gat gag gtt ttt gcc gcc gca acc gca aaa 384
 Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys
 115 120 125
 ctg gta cgc aat aat cgc cgc tgg agc gag aac tgg atg atc ggc att 432
 Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile
 130 135 140
 gcc ttc agt tca tgg tca tcg tgg gta ttt ggt acg gta ata ggg gca 480
 Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala
 145 150 155 160
 ttc tcc ggc agc ggc ttg ctg caa ggt tat ccc gcc gtt gaa gct gca 528
 Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala
 165 170 175

tta ggt ttt atg ctt ccg gca ctc ttt atg agt ttc ctg ctc gcc tct	576
Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser	
180 185 190	

ttc cag cgc aaa caa tct ctt tgc gtt acc gca gcg tta gtt ggt gcc	624
Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala	
195 200 205	

ctt gca ggc gta acg cta ttt tct att ccc gtc gcc att ctg gca ggc	672
Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly	
210 215 220	

att gtc tgt ggc tgc ctc act gcg tta atc cag gca ttc tgg caa gga	720
Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly	
225 230 235 240	

gcg ccc gat gag cta tga	738
Ala Pro Asp Glu Leu	
245	

<210> 4
 <211> 245
 <212> PRT
 <213> Escherichia coli

<400> 4

Met Glu Ser Pro Thr Pro Gln Pro Ala Pro Gly Ser Ala Thr Phe Met
1 5 10 15

Glu Gly Cys Lys Asp Ser Leu Pro Ile Val Ile Ser Tyr Ile Pro Val
20 25 30

Ala Phe Ala Phe Gly Leu Asn Ala Thr Arg Leu Gly Phe Ser Pro Leu
35 40 45

Glu Ser Val Phe Phe Ser Cys Ile Ile Tyr Ala Gly Ala Ser Gln Phe
50 55 60

Val Ile Thr Ala Met Leu Ala Ala Gly Ser Ser Leu Trp Ile Ala Ala
65 70 75 80

Leu Thr Val Met Ala Met Asp Val Arg His Val Leu Tyr Gly Pro Ser
85 90 95

Leu Arg Ser Arg Ile Ile Gln Arg Leu Gln Lys Ser Lys Thr Ala Leu
100 105 110

Trp Ala Phe Gly Leu Thr Asp Glu Val Phe Ala Ala Ala Thr Ala Lys
 115 120 125

Leu Val Arg Asn Asn Arg Arg Trp Ser Glu Asn Trp Met Ile Gly Ile
 130 135 140

Ala Phe Ser Ser Trp Ser Ser Trp Val Phe Gly Thr Val Ile Gly Ala
 145 150 155 160

Phe Ser Gly Ser Gly Leu Leu Gln Gly Tyr Pro Ala Val Glu Ala Ala
 165 170 175

Leu Gly Phe Met Leu Pro Ala Leu Phe Met Ser Phe Leu Leu Ala Ser
 180 185 190

Phe Gln Arg Lys Gln Ser Leu Cys Val Thr Ala Ala Leu Val Gly Ala
 195 200 205

Leu Ala Gly Val Thr Leu Phe Ser Ile Pro Val Ala Ile Leu Ala Gly
 210 215 220

Ile Val Cys Gly Cys Leu Thr Ala Leu Ile Gln Ala Phe Trp Gln Gly
 225 230 235 240

Ala Pro Asp Glu Leu
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<210> 5
 <211> 336
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 <213> Escherichia coli

<220>
 <221> CDS
 <222> (1)..(333)
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 Met Ser Tyr Glu Val Leu Leu Leu Gly Leu Leu Val Gly Val Ala Asn
 1 5 10 15

tat tgc ttc cgc tat ttg ccg ctg cgc ctg cgt gtg ggt aat gcc cgc 96
 Tyr Cys Phe Arg Tyr Leu Pro Leu Arg Leu Arg Val Gly Asn Ala Arg
 20 25 30

cca acc aaa cgt ggc gcg gta ggt att ttg ctc gac acc att ggc atc 144

Pro	Thr	Lys	Arg	Gly	Ala	Val	Gly	Ile	Leu	Leu	Asp	Thr	Ile	Gly	Ile		
		35					40				45						
gcc	tgc	ata	tgc	gct	ctg	ctg	gtt	gtc	tct	acc	gca	cca	gaa	gtg	atg	192	
Ala	Ser	Ile	Cys	Ala	Leu	Leu	Val	Val	Ser	Thr	Ala	Pro	Glu	Val	Met		
	50				55					60							
cac	gat	aca	cgc	cgt	ttc	gtg	ccc	acg	ctg	gtc	ggc	ttc	gcg	gta	ctg	240	
His	Asp	Thr	Arg	Arg	Phe	Val	Pro	Thr	Leu	Val	Gly	Phe	Ala	Val	Leu		
	65			70				75			80						
ggt	gcc	agt	ttc	tat	aaa	aca	cgc	agc	att	atc	atc	cca	aca	ctg	ctt	288	
Gly	Ala	Ser	Phe	Tyr	Lys	Thr	Arg	Ser	Ile	Ile	Ile	Pro	Thr	Leu	Leu		
			85					90						95			
agt	gcg	ctg	gcc	tat	ggg	ctc	gcc	tgg	aaa	gtg	atg	gcg	att	ata	taa	336	
Ser	Ala	Leu	Ala	Tyr	Gly	Leu	Ala	Trp	Lys	Val	Met	Ala	Ile	Ile			
		100						105					110				

<210> 6
 <211> 111
 <212> PRT
 <213> Escherichia coli

<400> 6

Met	Ser	Tyr	Glu	Val	Leu	Leu	Leu	Gly	Leu	Leu	Val	Gly	Val	Ala	Asn		
1			5					10						15			

Tyr	Cys	Phe	Arg	Tyr	Leu	Pro	Leu	Arg	Leu	Arg	Val	Gly	Asn	Ala	Arg		
			20					25					30				

Pro	Thr	Lys	Arg	Gly	Ala	Val	Gly	Ile	Leu	Leu	Asp	Thr	Ile	Gly	Ile		
		35					40				45						

Ala	Ser	Ile	Cys	Ala	Leu	Leu	Val	Val	Ser	Thr	Ala	Pro	Glu	Val	Met		
	50				55					60							

His	Asp	Thr	Arg	Arg	Phe	Val	Pro	Thr	Leu	Val	Gly	Phe	Ala	Val	Leu		
	65			70				75						80			

Gly	Ala	Ser	Phe	Tyr	Lys	Thr	Arg	Ser	Ile	Ile	Ile	Pro	Thr	Leu	Leu		
			85					90						95			

Ser	Ala	Leu	Ala	Tyr	Gly	Leu	Ala	Trp	Lys	Val	Met	Ala	Ile	Ile			
		100						105					110				

<210> 7
 <211> 37

<212> DNA
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 <220>
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<210> 8
 <211> 34
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Synthetic DNA

 <400> 8
 ctgtttctag atcctgtgtg aaattgttat ccgc 34

<210> 9
 <211> 28
 <212> DNA
 <213> Artificial Sequence

 <220>
 <223> Synthetic DNA

 <400> 9
 ggtctagata tggctaacat tatccggc 28

<210> 10
 <211> 28
 <212> DNA
 <213> Artificial Sequence

 <220>
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 <400> 10
 ccggatccaa acggagcatg gcagctcc 28

<210> 11
 <211> 648
 <212> DNA
 <213> Escherichia coli

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 <222> (1)..(645)
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<400> 11

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1 5 10 15	
ggg tta ttt gcg ctg gtc aac ccg gta ggg att att ccc gtc ttt atc	96
Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile	
20 25 30	
agc atg acc agt tat cag aca gcg gca gcg cga aac aaa act aac ctt	144
Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu	
35 40 45	
aca gcc aac ctg tct gtg gcc att atc ttg tgg atc tcg ctt ttt ctc	192
Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu	
50 55 60	
ggc gac acg att cta caa ctt ttt ggt ata tca att gat tcg ttc cgt	240
Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg	
65 70 75 80	
atc gcc ggg ggt atc ctg gtg gtg aca ata gcg atg tcg atg atc agc	288
Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser	
85 90 95	
ggc aag ctt ggc gag gat aaa cag aac aag caa gaa aaa tca gaa acc	336
Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr	
100 105 110	
gcg gta cgt gaa agc att ggt gtg gtg cca ctg gcg ttg ccg ttg atg	384
Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met	
115 120 125	
gcg ggg cca ggg gcg atc agt tct acc atc gtc tgg ggt acg cgt tat	432
Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr	
130 135 140	
cac agc att agc tat ctg ttt ggt ttc ttt gtg gct att gca ttg ttc	480
His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe	
145 150 155 160	
gct tta tgt tgt tgg gga ttg ttc cgc atg gca ccg tgg ctg gta cgg	528
Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg	
165 170 175	
gtt tta cgc cag acc ggc atc aac gtg att acg cgt att atg ggg cta	576
Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu	
180 185 190	
ttg ctg atg gca ttg ggg att gaa ttt atc gtt act ggt att aag ggg	624
Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly	
195 200 205	
att ttc ccc ggc ctg ctt aat taa	648
Ile Phe Pro Gly Leu Leu Asn	
210 215	

<210> 12
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 <212> PRT
 <213> Escherichia coli

<400> 12

Val Ile Gln Thr Phe Phe Asp Phe Pro Val Tyr Phe Lys Phe Phe Ile
 1 5 10 15

Gly Leu Phe Ala Leu Val Asn Pro Val Gly Ile Ile Pro Val Phe Ile
 20 25 30

Ser Met Thr Ser Tyr Gln Thr Ala Ala Ala Arg Asn Lys Thr Asn Leu
 35 40 45

Thr Ala Asn Leu Ser Val Ala Ile Ile Leu Trp Ile Ser Leu Phe Leu
 50 55 60

Gly Asp Thr Ile Leu Gln Leu Phe Gly Ile Ser Ile Asp Ser Phe Arg
 65 70 75 80

Ile Ala Gly Gly Ile Leu Val Val Thr Ile Ala Met Ser Met Ile Ser
 85 90 95

Gly Lys Leu Gly Glu Asp Lys Gln Asn Lys Gln Glu Lys Ser Glu Thr
 100 105 110

Ala Val Arg Glu Ser Ile Gly Val Val Pro Leu Ala Leu Pro Leu Met
 115 120 125

Ala Gly Pro Gly Ala Ile Ser Ser Thr Ile Val Trp Gly Thr Arg Tyr
 130 135 140

His Ser Ile Ser Tyr Leu Phe Gly Phe Phe Val Ala Ile Ala Leu Phe
 145 150 155 160

Ala Leu Cys Cys Trp Gly Leu Phe Arg Met Ala Pro Trp Leu Val Arg
 165 170 175

Val Leu Arg Gln Thr Gly Ile Asn Val Ile Thr Arg Ile Met Gly Leu
 180 185 190

Leu Leu Met Ala Leu Gly Ile Glu Phe Ile Val Thr Gly Ile Lys Gly

195

200

205

Ile Phe Pro Gly Leu Leu Asn
210 215

<210> 13
<211> 28
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<220>
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<210> 14
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic DNA

<400> 14
ccagatctgg tagttgtgac gctaccggg 29

<210> 15
<211> 594
<212> DNA
<213> Escherichia coli

<220>
<221> CDS
<222> (1)..(591)
<223>

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1 5 10 15

ccg ctc gga aac cta cct att ttc atg tcc gta ctg aaa cat act gaa 96
Pro Leu Gly Asn Leu Pro Ile Phe Met Ser Val Leu Lys His Thr Glu
20 25 30

ccg aaa aga cgg cgg gca atc atg gtg cga gag ttg ctt att gct ctc 144
Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu
35 40 45

ctg gtg atg ctg gtg ttc ctg ttt gcg ggt gag aaa att ctg gca ttt 192
Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe

50	55	60	
ctt agc cta cga gca gaa acc gtc tcc att tct ggc ggc atc att ctg Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu 65 70 75 80			240
ttt ctg atc gcc att aaa atg att ttc ccc agc gct tca gga aat agc Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser 85 90 95			288
agc ggg ctt ccg gca ggt gaa gag cca ttt atc gtg ccg ttg gca att Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile 100 105 110			336
ccg tta gtc gcc ggg ccg act att ctc gcc acg ctg atg ttg ttg tct Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser 115 120 125			384
cat cag tac ccg aat cag atg ggg cat ctg gtg att gct ctg ctg ctg His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu 130 135 140			432
gcc tgg ggc ggc acc ttt gtc atc ctg cta cag tct tcg cta ttt tta Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu 145 150 155 160			480
cgt ctg ctg ggc gag aaa ggg gtg aac gca ctt gaa cgc ctg atg gga Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly 165 170 175			528
ttg att ctg gtg atg atg gca acc cag atg ttc ctc gac ggc att cga Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg 180 185 190			576
atg tgg atg aag ggg taa Met Trp Met Lys Gly 195			594

<210> 16
 <211> 197
 <212> PRT
 <213> Escherichia coli

<400> 16

Met Asn Glu Ile Ile Ser Ala Ala Val Leu Leu Ile Leu Ile Met Asp
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20 25 30

Pro Lys Arg Arg Arg Ala Ile Met Val Arg Glu Leu Leu Ile Ala Leu
35 40 45

Leu Val Met Leu Val Phe Leu Phe Ala Gly Glu Lys Ile Leu Ala Phe
 50 55 60

Leu Ser Leu Arg Ala Glu Thr Val Ser Ile Ser Gly Gly Ile Ile Leu
 65 70 75 80

Phe Leu Ile Ala Ile Lys Met Ile Phe Pro Ser Ala Ser Gly Asn Ser
 85 90 95

Ser Gly Leu Pro Ala Gly Glu Glu Pro Phe Ile Val Pro Leu Ala Ile
 100 105 110

Pro Leu Val Ala Gly Pro Thr Ile Leu Ala Thr Leu Met Leu Leu Ser
 115 120 125

His Gln Tyr Pro Asn Gln Met Gly His Leu Val Ile Ala Leu Leu Leu
 130 135 140

Ala Trp Gly Gly Thr Phe Val Ile Leu Leu Gln Ser Ser Leu Phe Leu
 145 150 155 160

Arg Leu Leu Gly Glu Lys Gly Val Asn Ala Leu Glu Arg Leu Met Gly
 165 170 175

Leu Ile Leu Val Met Met Ala Thr Gln Met Phe Leu Asp Gly Ile Arg
 180 185 190

Met Trp Met Lys Gly
 195